

We claim:

1. A method for combining data from phase indeterminate data paths, comprising:

receiving a wireless signal at a receiving device, the wireless signal including a plurality of path components, each path component carrying a main phase indeterminate data stream derived from an original data stream;

splitting the received wireless signal into N signal copies and providing those N signal copies to N raking channels;

correlating each of the N signal copies with N locally-generated signals, respectively, to generate N correlated signals, each of the N correlated signals carrying a phase indeterminate path data stream that estimates one of the main phase indeterminate data streams from one of the plurality of path components;

synchronizing each of the N correlated signals to a system clock phase and a system clock frequency in the receiving device to generate N synchronized signals, each of the N synchronized signals carrying a synchronized path data stream;

aligning the N synchronized signals to generate N aligned signals, each of the N aligned signals carrying an aligned path data stream that is normalized in time with respect to the other (N-1) aligned signals; and

combining the N aligned signals to produce an estimated original data stream.

2. A method for combining data from phase indeterminate data paths, as recited in claim 1, wherein the wireless signal is a UWB signal.

3. A method for combining data from phase indeterminate data paths, as recited in claim 1, wherein each of the N locally-generated signals has a different phase with respect to the other (N-1) locally-generated signals.

4. A method for combining data from phase indeterminate data paths, as recited in claim 1, wherein the step of synchronizing each of the N correlated signals in phase and frequency with a system clock comprises the following for each of the N correlated signals:

performing an i^{th} write process at an i^{th} data phase and an i^{th} data frequency to write sequential data values from the phase indeterminate path data stream in the i^{th} correlated signal into a buffer;

performing an i^{th} read process at the system clock phase and the system clock frequency to read sequential data values out of the buffer to form the i^{th} synchronized signal;

determining for each cycle of the i^{th} read process whether the i^{th} read process is about to collide with the i^{th} write process; and

pausing the i^{th} read process by one cycle if the determining step determines that the i^{th} read step is about to collide with the i^{th} write process,

wherein i is an integer that varies from 1 to N , and

wherein the read frequency is greater than the write frequency.

5. A method for combining data from phase indeterminate data paths, as recited in claim 4, further comprising pausing all of the first through N^{th} read processes if any one of the first through N^{th} read processes are paused for a cycle.

6. A method for combining data from phase indeterminate data paths, as recited in claim 1, wherein the step of aligning the N synchronized signals comprises the following for each of the N correlated signals:

extracting an i^{th} synchronized data stream from an i^{th} synchronized signal;

extracting a control data stream from a control signal chosen from one of the N synchronized signals;

sequentially shifting the i^{th} synchronized data stream with respect to the control data stream by J to K cycles in order;

determining $(K - J + 1)$ correlation values based on correlations between the control data stream and the shifted i^{th} synchronized data streams for the J through K shift values;

determining which one of the J through K shift values provides the greatest correlation value; and

shifting the second signal by the one of the J through K shift values that provides the greatest correlation value shift to provide the i^{th} aligned data stream,

where J and K are integers.

7. A method for combining data from phase indeterminate data paths, as recited in claim 6, wherein J is -3 and K is 3.